In the Claims

I claim:

1. A system for measuring the spatial dimensions of a three-dimensional object, comprising:

a source of light for illuminating said object;

a lens and a sensor, the combination thereof defining an optical axis, said sensor including at least a first photodetector and a second photodetector;

said object to be measured being aligned with an object plane substantially normal to said optical axis;

said first photodetector being spaced a first distance from said lens and said second photodetector being spaced a second distance from said lens wherein said first distance is greater than said second distance, such that said first photodetector images at best focus a point in the object plane at some distance from said lens and determined by the focal length of said lens, and such that said second photodetector images at best focus a point further in said object plane from said lens, again determined by the focal length of said lens;

separate electrical outputs being generated by said first photodetector and by said second photodetector wherein intensities of said separate electrical outputs are proportional light collected from said object by said lens; and

an electronic processing module effective to capture and store said separate electrical outputs from at least said first and second photodetectors to determine distance along said optical axis from said lens to a point on said object by contrast comparison of at least said first and second photodetectors.

2. The system of claim 1 wherein said object is capable of being scanned relative to said sensor whereby different areas of said object are within the view of said sensor.

3. The system of claim 2 wherein at least one of said object and said sensor is capable of motion relative to the other.

4. The system of claim 3 wherein said motion is orthogonal to said optical axis.

5. The system of claim 4 wherein said motion periodically triggers data acquisition by said at least first and second photodetectors whereby first said first photodetector and at a later time said second photodetector acquire data about a same point on said object.

6. The system of claim 2 wherein a mirror scans an image of said object across said sensor whereby said relative motion occur without physical motion.

7. The system of claim 2 wherein said sensor includes a plurality of photodetectors arranged in a rectangular array.

8. The system of claim 7 wherein said rectangular array of photodetectors form an array plane that is tilted at an angle with respect to said optical axis.

9. The system of claim 8 wherein a line formed by an intersection of said array plane and said image plane is generally orthogonal to a direction of scanning of said object to said sensor.

10. The system of claim 9 wherein said rectangular arrays of photodetectors is formed from a series of linear arrays of photodetectors wherein each said linear array of photodetectors is independently read into said electronic processing module according to said trigger signal.

11. The system of claim 2 wherein said electronic processor functions as a buffer to an electronic computer, said computer managing one or more of motion control, sensor image acquisition, triggering and image analysis.

12. The system of claim 11 wherein said buffer converts said electronic signal from said sensor to a gray-scale value that is subsequently converted to a height measurement.

13. The system of claim 11 wherein said buffer includes an algorithm effective to determine z-axis height position of points on said objects with respect to said nominal object plane by contrast comparison.

14. The system of claim 2 wherein said lens has a numerical aperture of at least 0.1 for a shallow depth of focus

15. The system of claim 2 wherein said lens is telecentric.

16. The system of claim 8 wherein said photodetectors are circumscribed by a non-photoactive region

17. The system of claim 8 further including an illuminated reticle aligned with a beam splitter to project a reticle pattern onto a surface of said object.

18. The system of claim 17 wherein said projected pattern is aligned to be in best focus when said surface of said object is in best focus.

19. A system for measuring the spatial dimensions of a three-dimensional object, comprising:

a lens having a high degree of chromatic aberration and a sensor defining an optical axis normal to an object plane of said object and passing through a focal point of said lens;

said sensor having at least a first photodetector and a second photodetector optically aligned with said object through said lens and by a diffraction grating disposed between said lens and said sensor, whereby said diffraction grating separates the spectrum of light reaching said sensor such that different wavelengths of light collected from said object by said lens are then directed to different photodetectors on said sensor and furthermore because of the high degree of longitudinal chromic aberration of the lens, different wavelengths of light come to best focus in the object plane at different distances from said lens;

electrical outputs from each of said photodetectors being provided to a processor that determines a distance of said object from said lens and thereby a height of said object.

19. The system of claim 18 wherein said lens has numerical aperture of at least 0.1 to achieve a shallow depth of focus.

20. The system of claim 18 wherein said lens is telecentric.

21. The system of claim 19 wherein said object is capable of motion relative to said sensor.

22. The system of claim 21 wherein said motion is orthogonal to said optical axis.

23. The system of claim 21 wherein said motion periodically triggers data acquisition of the sensor to build up a three dimensional representation of the object.

24. The system of claim 18 wherein a multitude of photodetectors are used.

25. The system of claim 24 wherein said multitude of photodetectors forms a regular rectangular array.

26. The system of claim 24 wherein said processor acts as a buffer to an electronic computer, said electronic computer managing one or more of motion control, sensor image acquisition, triggering and image analysis.

27. The system of claim 26 wherein said electronic processing buffer converts said electronic signal from said sensor to a gray-scale value that is subsequently converted to a height measurement.

28. The system of claim 26 wherein said buffer includes an algorithm to determine z-axis height position of points on the object with respect to said nominal object plane by means of contrast comparison of said photodetectors.

29. A computer system as described in claim 11 that compares the three-dimensional representation of said object for conformance of said object to a stored quality standard.

30. A computer system as described in claim 25 that compares the three-dimensional representation of said object for conformance of said object to a stored quality standard.